CLAIMS

What is claimed is:

1. A process for manufacturing a coil structure for a magnetic head, comprising:

depositing an insulating layer;

depositing a photoresist layer on the insulating layer;

depositing a silicon dielectric layer on the photoresist layer;

masking the silicon dielectric layer;

reactive ion etching at least one channel in the silicon dielectric layer;

reactive ion etching at least one channel in the photoresist layer and the silicon dielectric layer, wherein the channel includes a first segment defining a first angle and a second segment defining a second angle;

depositing a conductive seed layer in the channel;

filling the channel with a conductive material to define a coil structure; and

chemical-mechanical polishing the conductive material and the conductive seed layer for the planarizing thereof.

2. The process as recited in claim 1, wherein the first segment of the channel is positioned below the second segment of the channel.

3. The process as recited in claim 2, wherein the first segment defines a beveled angle.

4. The process as recited in claim 3, wherein the first segment defines an angle between 70 and 85 degrees.

5. The process as recited in claim 2, wherein the second segment defines an angle that is substantially vertical.

6. The process as recited in claim 5, wherein the second segment defines an angle between 80 and 90 degrees.

7. The process as recited in claim 6, wherein the first segment defines an angle between 70 and 85 degrees.

8. The process as recited in claim 1, wherein the reactive ion etching includes $H_2/N_2/CH_3F/C_2H_4$ reducing chemistry.

9. The process as recited in claim 8, wherein the reducing chemistry includes $H_2/N_2/CH_3F/C_2H_4$ gas ratios of 50-100/100-200/1-3/1-10.

10. The process as recited in claim 8, wherein the reducing chemistry includes a pressure range of 5 to 20mTorr.

11. The process as recited in claim 8, wherein the reducing chemistry includes a temperature range of –30 to 0°C.

12. The process as recited in claim 8, wherein the reactive ion etching is carried out by an inductively coupled plasma system with a coil power including 900 to 1500 watts.

13. The process as recited in claim 1, wherein the reactive ion etching is carried out by an inductively coupled plasma system with a radio frequency (RF) power including 100 to 200 watts.

14. The process as recited in claim 1, wherein the reactive ion etching is carried out by an inductively coupled plasma system with a magnitude of a radio frequency (RF) bias including about 120V.

15. The process as recited in claim 1, wherein the photoresist is hard-baked.

16. The process as recited in claim 1, wherein the conductive seed layer includes at least one of Cu, Ta, and TaN.

17. The process as recited in claim 1, wherein the conductive material includes Cu.

18. The process as recited in claim 1, wherein the silicon dielectric layer includes at least one of SiO_2 and Si_3N_4.

19. The process as recited in claim 1, wherein an aspect ratio of the channel is at least 2.5.

20. The process as recited in claim 1, wherein the masking includes depositing another photoresist layer including an imaging photoresist layer.

21. The process as recited in claim 1, and further comprising removing at least part of the silicon dielectric layer.

22. The process as recited in claim 21, wherein the silicon dielectric layer is removed by chemical-mechanical polishing (CMP).

23. The process as recited in claim 1, and further comprising depositing an adhesion promoter layer between the silicon dielectric layer and the imaging photoresist layer.

24. The process as recited in claim 1, wherein the reactive ion etching includes CF_4/CHF_3 chemistry.

25. A magnetic head, comprising:

an insulating layer;

a photoresist layer positioned adjacent the insulating layer for defining at least one channel; and

a coil structure defined by a conductive material situated in the channel;

wherein a profile of the channel includes a first segment defining a first angle and a second segment defining a second angle.

26. The magnetic head as recited in claim 25, wherein the first segment of the channel is positioned below the second segment of the channel.

27. The magnetic head as recited in claim 26, wherein the first segment defines a beveled angle.

28. The magnetic head as recited in claim 27, wherein the first segment defines an angle between 70 and 85 degrees.

29. The magnetic head as recited in claim 26, wherein the second segment defines an angle that is substantially vertical.

30. The magnetic head as recited in claim 29, wherein the second segment defines an angle between 80 and 90 degrees.

31. The magnetic head as recited in claim 30, wherein the first segment defines an angle between 70 and 85 degrees.

32. The magnetic head as recited in claim 25, wherein the reactive ion etching includes $H_2/N_2/CH_3F/C_2H_4$ reducing chemistry.

33. The magnetic head as recited in claim 25, wherein the photoresist is hard-baked.

34. The magnetic head as recited in claim 25, wherein the conductive material includes Cu.

35. The magnetic head as recited in claim 25, wherein an aspect ratio of the channel and coil structure is at least 2.5.

36. A magnetic head manufactured utilizing a process, comprising:

depositing an insulating layer;

depositing a photoresist layer on the insulating layer;

depositing a silicon dielectric layer on the photoresist layer;

masking the silicon dielectric layer;

reactive ion etching a plurality of channels in the silicon dielectric layer using CF_4/CHF_3 chemistry;

reactive ion etching a plurality of channels in the photoresist layer and the silicon dielectric layer, wherein the channels each include a first segment defining a first angle and a second segment defining a second angle, wherein a $H_2/N_2/CH_3F/C_2H_4$ reducing chemistry is utilized in channel formation;

depositing a conductive seed layer in the channels;

electroplating the channels with a conductive material to define a coil structure; and

chemical-mechanical polishing the conductive material and the conductive seed layer for the planarizing thereof.

37. A disk drive system, comprising:

a magnetic recording disk;

a magnetic head including:

an insulating layer,

a photoresist layer positioned adjacent the insulating layer for defining at least channel, and

a coil structure defined by a conductive material situated in the channel,

wherein the channel and coil structure include a first segment defining a first angle and a second segment defining a second angle;

an actuator for moving the magnetic head across the magnetic recording disk so the magnetic head may access different regions of the magnetic recording disk; and

a controller electrically coupled to the magnetic head.